

selenium was then coated with shell-lac varnish, and about two hours afterwards again tested in the same manner as before, when the light was found to produce a deflection of 220 divisions, or more than twice the previous amount. The action of radiant heat was similar to that of light in the case of this particular specimen, but I have little doubt that *any* specimen may be rendered more sensitive to light by coating it with varnish or lampblack. I hope that this suggestion will prove of service to those philosophers who may aspire to "hear a beam of light" or to "see by electricity," and shall be glad to hear that such has been the case.

HERBERT TOMLINSON

King's College, Strand, March 7

Cave Animals and Multiple Centres of Species

THE readers of Seaper's "Existenzbedingungen der Thiere," now translated into English, will find (vol. ii. p. 268 of the German edition) an interesting discussion on the question of monophyletic or polyphyletic evolution of species, the author decidedly inclining to the latter hypothesis. Considering that at the root of the manifold and difficult problems here involved, there is the relatively simple one of single or multiple centres of each species in a biographical sense, I take leave to ask the following question, hoping for an answer from among your readers versed in these matters.

To me it seems impossible to maintain the single centres of species in a strict and definite sense without also maintaining the single progenitor of each species, which latter view, formerly considered as a necessary assumption, has been given up by Mr. Darwin in Chapter IV. of the later editions of the "Origin of Species" (5th ed. p. 103, 104). Of course the acceptance of single centres, in the sense of more or less restricted areas of origination, may remain valid for the vast majority of species—but this is very different from considering it, once for all, as "a necessary consequence of the adoption of Darwinian views," as has been formerly said by Mr. Bentham (NATURE, vol. ii. p. 112).

Now, I have sometimes thought that there might be a test for the possibility of multiple centres, which, eventually, would amount almost to an experimental demonstration—namely: *whether there are cases of the same species of blind animals occurring in different caves distant from and without subterranean communication with each other?* Should such cases occur it would be most improbable that the animals in question had been transported from one cave to the other in the modified state, and most probable that they had been independently evolved in each cave from identical species which entered it from without. I formerly noted one instance perhaps in point, viz. a statement of Prof. Cope's (NATURE, vol. vii. p. 11) that "the blind fish of the Wyandotte Cave is the same as that of the Mammoth, the *Amblyopsis spelaeus*, Dkay," but I am not aware whether subterranean communication is, or has been, impossible in this instance. Perhaps more decisive cases have become known of late?

Freilburg im Breisgau, March 4

D. WETTERHAN

Prehistoric Europe

WILL you kindly allow me to correct a clerical error in my letter which appeared in NATURE, vol. xxiii. p. 433. For "hash-up" of the species, read "hash-up" of species. A number of the species from the Upper or Interglacial Bone-bed of Mont Perrier (and some of which are mentioned in my letter) are of course too characteristically Pleistocene to be claimed by Prof. Dawkins as Pliocene forms, and do not therefore appear in his list of Upper Pliocene species to which I referred.

Perth, March 14

JAMES GEIKIE

Measuring the Height of Clouds

IN NATURE, vol. xxiii. p. 244, Mr. Edwin Clark gives a method whereby the height or distance of clouds may be measured. This end has already been attained by me, several years ago, and I believe with adequate success. I have also worked out the method in detail, so that its practical realisation no longer offers any difficulty. It is very simple and easy, and the apparatus ("nephoscope") is not difficult to make. A full description of the nephoscope will be found in the *Zeitschrift der Oesterreich. Ges. für Meteorologie*, edited by Jelinek and Hann, vol. ii. p. 337, in so far as the instrument serves for measuring the direction and velocity of the passage of clouds. In order also to ascertain the absolute height of clouds (N.B. all without calcula-

tion) I have introduced an improvement. This and a guide to practical use I have published in the same *Zeitschrift* (vol. ix. September, 1874, pp. 257-61). I believe Mr. Edwin Clark will find in the article referred to his idea fully worked out.

C. BRAUN,

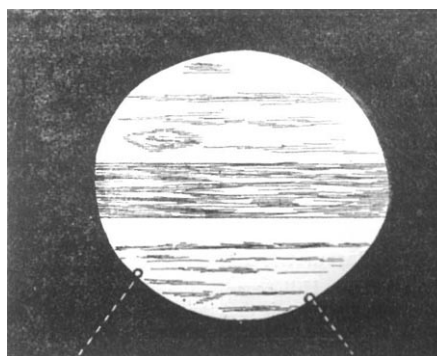
Kalocsa, Hungary, March 3 Director of the Observatory

Occultation of 73 Piscium

I OBSERVED here this evening the occultation of 73 Piscium by Jupiter, which was predicted in your "Astronomical Column" under the date December 23, 1880 (NATURE, vol. xxiii. p. 183). At 1h. 52m. 30s. G.M.T. the star was hanging on the limb of the planet, and by 1h. 54m. it had entirely disappeared.

The phenomenon strongly resembled the occultation of a satellite, except that the disappearance was more rapid. But it was not instantaneous as I had expected. The planet and star appeared to cohere for about one and a half minute. The contrast in their colours was very marked, Jupiter appearing of a yellowish tinge, while the star shone out white like a diamond. During the occultation the red spot was on the planet's disk, and its following end was in about the same meridian as the point of the star's occultation.

I had no micrometer, but I inclose a diagram showing the estimated points of occultation and reappearance.



Point of disappearance

Point of reappearance

The G.M.T. of reappearance was 2h. 44m., when the star was again observed to hang on to the planet's limb.

The telescope used was a $4\frac{1}{2}$ inch refractor by Cooke equatorially mounted, with a power of 96.

The planet was well placed for observation, being nearly in the zenith.

Before and after the occultation Jupiter appeared as if with five moons, the star being almost indistinguishable from the satellites.

As the occultation could not be observed in Europe these few notes may possibly prove of some interest.

A diagonal (prism) eyepiece was used in making the sketch.

Meean Meer, Lahore, February 3

H. COLLETT

Colours of British Butterflies

MOST of the protectively coloured British butterflies pair either on the ground as the "Blues," or on low herbage as the majority, or on the leaves of trees, as some of the "Hair-streaks," and with closed wings. The wings of both sexes are usually opened as widely as possible immediately before copulation.

I have been struck by the fact, which I may mention in reference to the remark of Mr. J. Innes Rogers (NATURE, vol. xxiii. p. 435), that I have never seen the "peacock" attacked by any British bird, and I have often watched him flaunting his colours in the presence of shrike, flycatchers, and other—one would imagine dangerous—company.

W. CLEMENT LEY

Ashby Parva, Lutterworth, March 11

Lecture Representation of the Aurora Borealis

I HAVE recently employed a simple device for giving to an audience a vivid idea of an aurora, and that has been to paint a

representation of it with Balmain's luminous paint. When dry the drawing may be hung up in the lecture-hall and covered with black tissue-paper until required. At the appointed time the lights are lowered, the tissue-paper withdrawn, and magnesium wire burnt in front of the painting. I had last week the pleasure of showing this to an audience of 500 persons, and from the expressions of curiosity and approval found it to be a very taking experiment.

WM. ACKROYD

Sowerby Bridge, March 10

Squirrels Crossing Water

HAVING read in NATURE the two interesting communications on Squirrels Crossing Water, I was so free as to cite them in my paper *Lumir*, requesting the readers to let me know whether any of them had seen instances of squirrels taking to water here in Bohemia. Upon this I received from my friend Prof. A. Tírášch of Litomyšl the following:—

"You seem to doubt of squirrels taking to water, and I hasten to give you notice of what I myself witnessed when a boy. With the help of other young fellows like myself I succeeded in driving a squirrel down from an old ash-tree that stood in our garden, not far from the River Medhuje (Metan). The squirrel must have come from the other side of the water, where there was a wood, and must have crossed the river. Of this however I cannot be sure, but when driven down from the tree, and seeing its way to landward cut off, the squirrel turned to the river, and sprang in, I following it. Now it swam very cleverly, but was overtaken by me in the middle of the water, and brought back in triumph, of course with my hands all bleeding from its sharp teeth, which the animal used cleverly too."

Prague, March 13

T. V. SLÁDEK

Tacitus on the Aurora

THERE is a passage in the "Germania" of Tacitus (chapter xlv.) which I do not think can have ever been examined by the historians of natural science, or it would have created a considerable stir amongst them. Side by side with a plain account—probably the earliest written one—of an arctic twilight, there lurks in it a description of the aurora borealis, which moreover lends countenance to the still prevailing notion that the northern lights are accompanied by sound.

Speaking of the Suiones, a tribe on the northern borders of Germany, the great writer says:—"Beyond them is another sea, calm even to stagnation, by which the circle of the earth is believed to be surrounded and confined; because the last gleam of the setting sun lingers till he rises again, and so brightly that it dims the stars. It is believed too that a sound is heard, that the forms of gods and rays from a head are seen (persuasio adjicit sonum audiri insuper formas deorum et radios capitis adspici). Up to that point [however]—and the report [I have given] is true—everything is natural."

As to the question of sounds being heard, the din of carts and factories in our city, and the roar of trains in our suburbs make an observation here for determining it impossible; while the rarity of the phenomenon in England generally keeps spectators from being on the watch. But I have heard an intelligent old man who has often gazed on the bright streamers during the clear still nights of Aberdeenshire declare that he has plainly observed sharp switching sounds to proceed from them. It seems to me probable, since electricity can change into sound and takes part in producing the aurora, that the spectacle is attended by audible vibrations.

M. L. ROUSE

Chislehurst, Kent

ON THE PRACTICABILITY OF LIVING AT GREAT ELEVATIONS ABOVE THE LEVEL OF THE SEA¹

"UP to this time most of the loftiest portions of the earth are totally unexplored, and this arises principally from the fact that the mountaineer, in addition to experiencing all of the troubles which occur to other travellers, has to deal with some which are peculiar to his work. I do not now refer to the 'distressing hæmorrhages,' 'alarming vomitings,' and 'painful excoriations' which are said to afflict him. Hæmorrhage and excoriation are rather large words, and they are apt to be alarming if they are not translated. But they do not seem so very formidable if they are rendered 'bleeding at the nose' and 'loss of skin through sunburn'; and it may perhaps tend still further to allay alarm if I say that I have never known bleeding at the nose to occur upon a mountain except to those who were subject to the complaint; while with regard to vomitings, although such unpleasant occurrences *do* happen, they have only been known when persons have taken that which has disagreed with them."

"There is, however, behind these, another trouble, which cannot be dismissed so lightly. All travellers, without exception, who have ever attained to great altitudes, have spoken of having been affected by a mysterious complaint, and this complaint is known to affect native races living in high mountain regions, as well as casual travellers. With us it is usually called mountain sickness. There are many native names for it, and numerous conjectures have been put forward as to its cause. Very commonly it is supposed to be the work of evil spirits, or mysterious 'local influences'; but there is no doubt that it is simply an effect which is the result of the diminution in the atmospheric pressure which is experienced as one goes upward. The reduction which takes place at great heights is quite sufficient to account for disturbance of the human system. At 20,000 feet pressure is less than half the amount that it is at the level of the sea; that is to say, whereas at the level of the sea atmospheric pressure is generally capable of sustaining a column of mercury of thirty inches, at 20,000 feet it will not sustain a column of fifteen inches. * * * * *

"From air-pump experiments, and from purely philosophical considerations, it is obvious that the human system must be liable to derangement if subjected to sudden diminution of the atmospheric pressure to which it has been accustomed. These disturbances have often been so severe as to render mountain travellers incapable, and their lives well-nigh unendurable; and it is scarcely to be wondered at that they have endeavoured to escape from the infliction by descending into lower regions. I do not know a single instance of a traveller who, having been attacked in this way, has deliberately, so to speak, sat it out, and had a pitched battle with the enemy. Nor am I aware that any one has even suggested the bare possibility of coming out victorious from such an encounter. Yet, upon doing so, depended the chance of pushing explorations into the highest regions of the earth; and I long felt a keen desire to know whether my own organisation, at least, could not accommodate itself to the altered conditions. From considerations which would occupy too long to enter into now, I gradually acquired the conviction that patience and perseverance were the principal requisites for success; and the journey of which I am now going to speak was undertaken with the view of bringing this matter, amongst other things, to a definite issue. In the course of it we camped out at very great heights. Twenty-one nights were spent above 14,000 feet above the level of the sea; eight more above 15,000 feet; thirteen more above 16,000 feet; six more above 17,000 feet; and one more at 19,450 feet. I shall not now anticipate what you will presently hear, and I have made these preliminary observations to render less frequent the interruption of the narrative, and for the purpose of explaining allusions in it which might otherwise perhaps have been only half-understood."

After describing the route taken to Chimborazo, Mr. Whymper proceeded to mention the first journey he made to that mountain; and said that whilst returning from it to the town of Guaranda (8870 feet), whilst still about 13,000 feet above the sea, he was overcome by dizziness, feverishness, and intense headache, and had to be supported by two of his people for the greater part of the

¹ Extracts made, by permission of the author, from a lecture delivered by Edward Whymper to the Society of Arts in the Theatre at South Kensington, March 9, 1881—"On Chimborazo and Cotopaxi."